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ABSTRACT

This study evaluated the effect of a comprehensive training program for teachers based on Madeline Hunter's Instructional Theory Into Practice (ITIP). To examine the question of implementation, teachers in the first through fourth grades in Napa Valley elementary schools were observed teaching two reading and two mathematics classes before and after trainng. Program implementation was measured using the Instructional Skills Observation Instrument (OSOI) which rated how well the teacher: (1) provided a set of focus for the lesson; (2) provided instruction; (3) directed guided practice; and (4) monitored independent practice. A description is given of the comprehensive inservice training sessions on implementing these four components of the Hunter ITIP. The major questions of the study focused upon the relationship between teacher implementation of the Instructional Skills Program, student engaged rates, and student achievement. Findings indicated that over a two-year period higher achievement in both mathematics and reading was evident in the performance of students of teachers with the higher OSOI ratings. An analysis of the results includes consideration of other factors which may have influenced student outcomes. One finding in particular is noted: children with limited English speaking skills benefitted from the program. Statistical data on the study are presented in tabular format. (JD)

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UNDER WHAT CONDITIONS DO CHILDREN THRIVE IN THE MADELINE HUNTER MODEL?

A REPORT OF PROJECT FOLLOW THROUGH, NAPA, CALIFORNIA

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UNDER WHAT CONDITIONS DO CHILDREN THRIVE IN THE MADELINE HUNTER MODEL?

A REPORT OF PROJECT FOLLOW THROUGH, NAPA, CALIFORNIA

One of the most popular educational models to emerge from the 1970s is Madeline Hunter's Instructional Theory Into Practice (ITIP). Disciples trained in the model are ardent and rigorous in their commitment. Thousands of teachers and principals across the country are using the Hunter vocabulary to talk about teaching: a "sponge" is not used in the bath, it is an activity to soak up time that might be wasted; a "dipstick" is not used to measure oil, but is a method to test the understanding of pupils; a "birdwalk" is a deviation from the teacher's instructional objective.

In this model teachers learn to design lessons using very specific components. Lessons presenting new concepts start with a "set". This is like setting the stage and getting all students involved. The set is followed by a statement of the lesson's purpose and clear observable objectives. The information delivered to students is given in segments, followed by checks for understanding and guided practice. At the end of the lesson a final check for all students' understanding serves as closure. Students who have demonstrated mastery during closure proceed to independent practice. The project from which this report originates refers to the above steps as the five-step lesson plan.

In spite of the model's popularity and wide use, little systematic research has been conducted to test its effectiveness. The purpose of the study presented here was to evaluate the effect of a comprehensive training program based primarily upon ITIP. The proposal originated from and the project was developed by staff in the Napa County Schools. This project was one of four longitudinal Follow Through grants funded by the National

Institute of Education (NIE) to improve the reading and mathematics achievement of Chapter 1 eligible children. Other Follow Through projects were funded in Detroit, Michigan; Oakland, California; and Cotopaxi, Colorado.

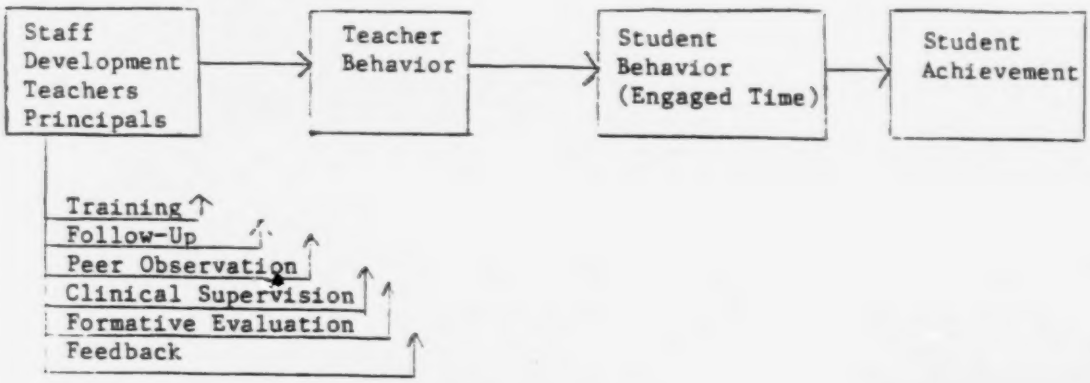
NIE's intent in funding these projects was to develop training systems aimed at improving classroom instructional processes. The expected outcomes were an increase in the amount of time students spent on task and more gain in achievement test scores. One stipulation for receiving the grant was that aides in target classrooms would be released or reassigned to non-target classrooms. The expectation was that if teachers were trained to be efficient managers and instructors, aides would not be required. The effectiveness of aides in classrooms has long been in question. If the training program proved successful, costs for staff development and clinical supervision could then be absorbed by funds originally allocated for aides.

NIE specified a four-phase Follow Through study. Each project was given a year start-up phase to recruit schools and to select, develop, and field test the instruments to be used in the evaluation. The purposes of Phases II, III, and IV were to implement the training program, collect implementation and student data, and revise the study on the basis of feedback from the evaluation. The findings from the evaluation of Phases II and III are reported in this article. During Phase IV, which is in progress, participants are expected to become more reliant upon their own internal structures and less dependent upon the Follow Through project staff.

Design

The project is being conducted within two central California school districts by the principals, first through fourth grade teachers, and

students at two elementary schools. The Follow Through project staff includes a director, a coordinator, and a trainer who are all qualified trainers in the Madeline Hunter ITIP model. Although classroom management and effective use of time have been included as training components, ITIP was the major training thrust during Phases II and III. Relationships between program implementation, teacher behavior, and student outcomes will be examined over two phases. The design of the program is illustrated in Figure 1.



Program Design

Figure 1

Sample Description

The two schools selected for the study had the largest percentage of Chapter I eligible children in their school districts. School #1 had 44 percent and School #2 had 35 percent scoring below the 35th percentile on achievement tests. The students and staff attending these schools are described on Table 1. School #1 was approximately twice as large as School #2 in terms of students and teachers. The class size of each school was approximately 30 students. Migrant children accounted for 7 percent of the students at School #1 and 13 percent at School #2. Those who had Limited English Speaking (LES)

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Table 1

1984 Enrollment

Grade Enrollment	SCHOOL #1 # of Students	# New to School	# Retained in Grade	Chapter I Eligible*	SCHOOL #2 # of Students	# New to School	# Retained in Grade	Chapter I Eligible*
K	67	67	0	25	31	30	2	25
1	91	19	6	37	40	9	5	18
2	71	12	1	37	35	5	2	17
3	67	5	0	47	22	3	0	18
4	71	9	0	39	33	6	1	10
TOTAL	367	112	7	163	161	53	10	88
PERCENT		30%		44%		32%		59%

Special Program	SCHOOL #1 Number of Students	Percent	SCHOOL #2 Number of Students	Percent
Gifted and Talented	7	2%	10	6%
Speech	30	8%	13	8%
Special Education	34	9%	11	7%
Migrant Education	27	7%	21	13%
Limited English Proficiency	96	25%	23	14%

*Performs below 35%

skills made up 25 percent of the students in School #1 and 14 percent in School #2 in fall, 1984. In School #1, the LES students were included in the testing; in School #2 they were not. In the fall of each year approximately 30 percent of the students were new in each school.

For the purposes of evaluating the study, we hoped at least the staff would remain stable in both schools. Since its inception, four teachers have left the project and three new teachers have been hired. The data reported for 1982-1983 and 1983-1984 include only those teachers and students who have been in the project since its inception.

Allocated Time

The time allocated to reading and mathematics differed somewhat for the two schools. School #2 prescribed 70 minutes of reading and 50 minutes of mathematics for first through fourth grade. In School #1, time for first, second and third grade was the same as School #2. In fourth grade reading was reduced by 20 minutes and mathematics was increased by 10 minutes.

Staff Development

The focus of the staff development program is on improving the instruction and classroom management skills of teachers. The expectation is that students will then be more engaged in their studies and improve their achievement test scores. To reach the goals of the project, a three-year staff development program for teachers and principals was developed.

Starting in January of Phase II there were five training sessions to teach ITIP. These sessions on Set, Instruction, Guided Practice, Closure, and Independent Practice were followed up by visits and

feedback from the Follow Through project staff. During this period all teachers received at least five follow-up visits. Teachers who requested more assistance received as many as nine follow-up visits.

In Phase III, training activities were provided from August through April. These activities included:

Classroom Management, Effective Directions, Sponge Activities;
Grouping;
Monitoring (Praise, Prompt and Leave);
Motivation, Retention, Practice Theory;
5-Step Lesson Review and Practice;
Test-Taking Strategies.

Because principals felt it important that the total faculty take part in the program, kindergarten through sixth grade teachers at both schools attended the above inservices. Inservices were conducted during the regular duty day. Substitutes were hired and teachers were released to attend the trainings. The principals at both schools attended all inservices.

At the end of each inservice, participants scheduled follow-up visits with the consultant(s) conducting the workshop. These visits provided the opportunity for participants to get feedback on their use of newly-learned skills in their own classrooms. The overall goal of each strategy was to assist teachers in internalizing newly-learned teaching behaviors to improve student engaged time and achievement.

Training and Support Services for Principals

The principals' training program was a set of services delivered through consultation, modeling, coaching, and exposure to a collegial support group. The training topics for principals included:

Characteristics of Effective Schools
Leadership Styles
Administrative Monitoring Strategies
Time Off Task Instrument
Clinical Supervision
Cognitive Coaching

Team Building
Collaborative Planning
Problem Solving
Decision Making
Effective Meeting Management
Identification and Allocation of Resources
Superlearning

Procedures

The instruments to measure the quality and quantity of program implementation and student engaged rate were developed, piloted, and revised in Phase I of the project. These included the Instructional Skills Observation Instrument (ISOI), the Time Off Task observation (TOT), teacher and principal questionnaires, and interviews. Reading and mathematics achievement tests were available from the schools for all grade levels each year of the study. The data collection schedule is described on Table 2.

Table 2

DATA COLLECTION SCHEDULE

	1982 Spring	1982 Fall	1983 Winter	1983 Spring	1983 Fall	1984 Spring	1985
ISOI			x	x		x	x
Engaged Rate		x		x	x	x	x
Achievement	x			x		x	x
Interviews	x			x		x	x

Instructional Skills Observation (ISOI)

Teachers' implementation of the training program was measured by the ISOI (Wolfe, 1982). This instrument measured the quality and appropriateness of four program components: set/purpose/objectives; instruction; guided practice; and independent practice. The fifth

step, closure, was subsumed in guided practice. Operational definitions for the observed components were developed with the assistance of Madeline Hunter. Observers skilled in ITIP methodology were trained in a three-day session where they achieved an interrater agreement of .83 or greater.

Each teacher was observed in two mathematics periods and two reading periods at baseline (before the training was provided) and at each spring data collection period. Scores on the four subcategories were aggregated to a total score for each teacher. The total scores, averaged for the two reading observations, were used in the analyses. The same process was used for mathematics.

Engaged Rate Observations

Student engaged rate was measured for every student in the study. The sample of behavior included approximately 20 observations during reading and 20 during mathematics collected on two days at each data collection period. A record was kept of each student who exhibited the following off task behaviors during the observation period: chatting, disrupting, waiting, personal needs, and uninvolved. If a student was on task and doing what was expected, no entry was made beside the student's name. Computations for percentage student engaged rates began with the off task frequency divided by the number of observations. To maintain a unidimensionality of scaling, each student's percentages of time off task for reading and for mathematics were subtracted from 100 to obtain an engaged rate. These percentages were then divided by 100 to allow for arcsin conversion.

Observers were trained during a two-day session which included an examination of interrater agreement in classrooms. The agreement among the three observers collecting data was .85 or above.

Achievement Tests

Achievement tests were administered to the students by each teacher in May each year of the study. School #1's district historically uses the Stanford Achievement Test, and School #2's district uses the California Achievement Test. It was not economically feasible for either school to change tests, thus a percentile score was recorded for each student. This provided a standardized score to be used for comparative purposes. Percentile scores were transformed to normal curve equivalents for use in analyses.

Methods Used in Conducting Analyses

Correlations. To compute Pearson Product-Moment Correlations on pairs of means, the SPSS Pearson correlation subprogram was used. The option for pairwise deletion was selected so that a case was dropped from the computation of a given coefficient when either of the variables involved in that coefficient was missing. Thus, only cases for which there were complete data were included in computations of all coefficients.

T-tests. The SPSS one-tailed t-test for paired samples examined the difference between 1982 and 1983 measures, and between 1983 and 1984 measures. Paired t-tests were performed because the repeated measurements are dependent (pretest/posttest) and, hence, yield correlated sample means.

Scatterplots. Teachers' implementation scores in reading and mathematics were plotted to examine the trend of teacher skills from winter 1983 to spring 1984. Scatterplots were also used to illustrate students' engaged rate patterns in reading and in mathematics over three points in time.

Analysis and Results

Phase III analyses paralleled the analysis of Phase II. The major questions of the study focused upon the relationships between teacher implementation of the Napa County Instructional Skills program, student engaged rates, and student achievement. The data available included teachers' Instructional Skills Observations, students' Time on Task observations, achievement test scores for students, and teacher and principal interviews and questionnaires. Analyses to test for differences have been conducted at several levels: project, school, teacher, and student.

Instructional Skills Implementation

At the heart of this study is the question of whether a group of ordinary teachers found in the schools at the inception of the program could be trained to use more effective instructional techniques. To examine the question of implementation, teachers were observed teaching two reading and two mathematics classes before the training began (winter 1983) and spring 1983 and 1984.

As described in the Procedures section, program implementation was measured using the Instructional Skills Observation Instrument (ISOI). The ISOI was designed to measure the degree to which four principal components of the Madeline Hunter model were used. Observers rated how well the teacher (1) provided a set or focus for the lesson, (2) provided instruction, (3) directed guided practice, and (4) monitored independent practice. The critical issue was not whether the element was used, but was it needed for the lesson and if so, was it used effectively. If a teacher accomplished each component perfectly, a score of 88 could be earned.

Instructional Skills training was provided throughout the 1983-1984 school year as described in the previous section. Of interest to this

analysis are the changes in teacher instructional skills from inception of the project (winter 1983) to spring 1983 and spring 1984. Data displayed on Table 3 indicate that overall for the project teachers improved their instructional skills significantly in the four-month span from winter 1983 to spring 1983 (a 10 point improvement in the reading mean and a 16 point improvement in the mathematics mean). However, the greatest change (19 points) occurred in reading instruction during the school year 1983-1984. This finding is very rewarding since the project trainers and teachers worked very hard during that school year to improve their reading instructional skills. Many opportunities were provided for teachers to attend training sessions, be observed by the project personnel, and receive guidance and assistance in implementing the program.

Another indication of the success of the training program is that the range in teacher performance was dramatically reduced. The increasing consistency in teacher behavior is shown graphically on Figure 2. This figure illustrates the narrowing range of scores from the inception of the project. At baseline, one teacher scored as low as 7 points on implementation in reading and another scored as high as 81. In spring 1984, all teachers scored above 50. From the inception of the project, teachers at School #2 (dotted lines) scored higher than did teachers at School #1 (solid lines). This initial high performance of teachers in School #2 may be explained in part by the principal's prior exposure to the Hunter training program and the instructional leadership he provided even before the project began.

In the interviews conducted by the evaluator in June 1984, seven of the 13 project teachers said that overall the five-step lesson plan had become natural or automatic for them. They might not use all of the steps in every lesson but they used what they felt was appropriate. There was a

Table 3

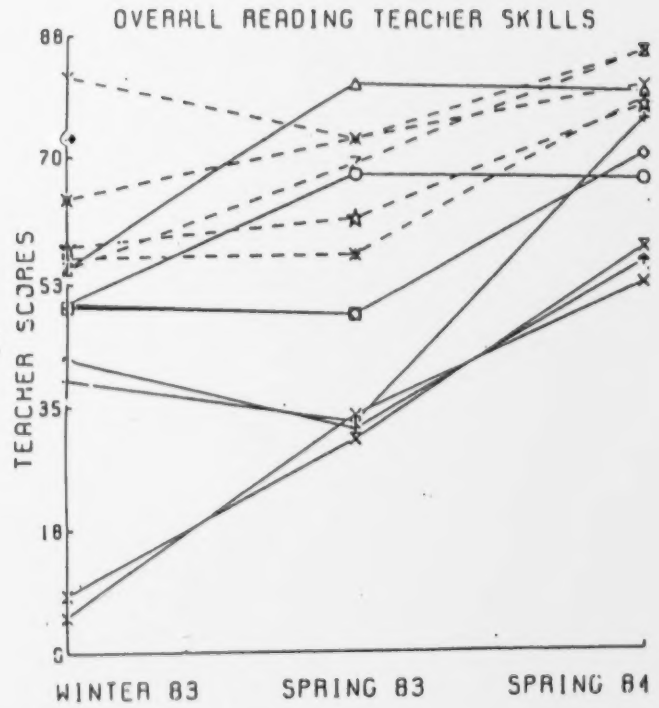
T-tests on Mean Teacher ISOI Skills

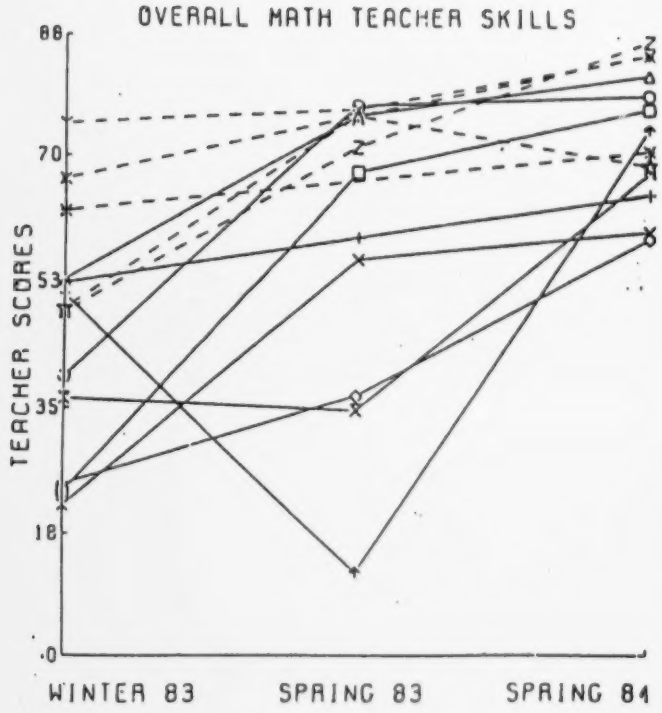
READING

Variables	Mean	Std. Dev.	Difference of Means	T Value	Deg. of Freedom	One-tailed Probability
ISOI Winter '83	45	10.2				
			10	1.93	12	*.038
ISOI Spring '83	55	6.8				
ISOI Spring '83	55	6.8				
			19	4.74	11	*.0005
ISOI Spring '84	74	4.3				

MATH

ISOI Winter '83	44	6.9				
			16	2.20	11	*.025
ISOI Spring '83	60	8.4				
ISOI Spring '83	60	8.4				
			16	2.88	10	*.008
ISOI Spring '84	76	4.0				





Teachers at School #1
Teachers at School #2

Figure 2

ISOI Teacher Implementation Scores

strong congruence between teachers who felt easy with the program and high implementation scores. On some specific aspects of the program, five teachers said it was difficult to check for understanding with every child at the end of each skill and that it was difficult to provide closure, in the technical sense, at the end of each activity. Some teachers voiced frustration that they could not complete the lengthy five-step lesson plan for each objective and cover the required district curriculum. Most teachers felt that it was easier to use the five-step plan in mathematics where each skill is discrete; it was more difficult to use when teaching reading comprehension. Those who felt successful in teaching reading said their textbook was organized so that it seemed to follow the five-step plan. One teacher who felt reluctant at being included in the project had her score drop dramatically in mathematics in spring 1983. After several helpful sessions and feedback the teacher improved in spring 1984.

Some teachers in the interviews cautioned against thinking that the five-step lesson plan was totally responsible for the children's improvement in engaged rate and achievement in mathematics and reading. One thought the project staff's willingness to sit down with individual teachers, talk about specific children and analyze what was going on with that child was most helpful in planning lessons. In addition, lessons in classroom management based upon Evertson, Anderson and Emmer (1980) had been helpful in organizing the room and using the available time. This teacher also felt that the collegiality which had developed between teachers was effective in helping them to become better teachers. Factors such as collegiality and the level of effort of the training staff have been included as descriptive data but have not been quantified or used in statistical analyses.

Overall, scores on the ISOI and teacher reports indicated that by the

end of school year 1984 the thirteen teachers for whom there was longitudinal data were implementing the instructional program to a very high degree. In fact, seven of the teachers were at this time near the top of the scale.

Student Engaged Rate

The first level of analysis for the project was to examine for increase in student engaged rate. Transforming the engaged rate proportions with the arcsine transformation enabled the computation of t-tests. A mean engaged rate was generated for all students in the study for spring 1983 and spring 1984 in both reading and mathematics (see Table 4). Overall, highly significant improvement in the engaged rate of students was found in reading and mathematics. Percentages of engaged rate time increased overall from 84.5% in reading to 94.2% and from 83.7% in mathematics to 94.0%. In a 50-minute period this would be a saving of 5 minutes per day. During a 180-day school year this would be an increase of 15 hours in which students would be engaged in their work. Clearly one important objective of the project had been achieved.

Engaged rate patterns differed for each teacher's classroom. The computation of t-tests comparing data from fall 1983 and spring 1984 indicated significant increases in engaged rates for children in eight of thirteen teacher's classrooms in reading and seven of thirteen teacher's classrooms in mathematics.

Student Achievement

T-tests were used to compare the difference of the achievement test means from year one to year two of the project, and from year two to year three of the project. It was encouraging to find that from the inception of the project significant gains were made in reading during school years 1982-1983 and 1983-1984 (see Table 5). Significant gains were made in

Table 4

T-tests on Engaged Rates at Project Level - Spring 1983 - Spring 1984

Year	Mean	Difference of Mean	Std. Deviation	T-value	Degree of Freedom	One-Tailed Probability
Reading						
Spring 1983	2.327					
		.347	.59	8.24	192	.000
Spring 1984	2.674					
Math						
Spring 1983	2.315					
		.335	.524	9.19	206	.000
Spring 1984	2.649					

The engaged rates are presented as proportions which have been transformed using the function

$$X_{ijk} = 2 \arcsin \sqrt{X_{ijk}}$$

Table 5

T-tests of Student Achievement 1982-1983
Project Level: 1983-1984

Year	Mean	Difference of Mean	Std. Deviation	T-value	Degree of Freedom	One-tailed Probability
Reading						
1982	43.58					
		2.79	14.45	2.02	265	*.02
1983	46.37					
1983	46.37					
		3.03	13.13	3.38	202	*.005
1984	49.40					
Math						
1982	49.40					
		2.13	14.55	2.38	264	*.009
1983	52.03					
1983	52.03					
		.60	13.67	.54	198	.25
1984	52.63					

mathematics during school year 1982-1983 only. The strong positive effect in reading may be the result of a concerted effort on the part of the project staff and the teachers to improve the teaching of reading during Phase III of the project. This pattern of significant achievement in reading for both years of the study and only for the first year in mathematics was repeated for each school. School #2 allocated more class time to reading and mathematics and their initial scores were higher than the scores of School #1. However, the gain in reading was superior for School #1.

A longitudinal study has the rare opportunity to monitor students' achievement over several years. Successful schools, as Edmonds (1981) pointed out, are those which help all students, low achieving and high achieving, make progress. In this study the percent of children performing in each quarter of the standardized achievement test norms for the grade level has been recorded for each year of the study. Over time, if the training program was implemented and if the program was effective, there should be fewer students in the lower quarter and more in the upper quarter of the test score norms for the grade level. The results of this analysis are shown on Table 6. Compared with the baseline year, in spring 1984 there are 15 percent fewer students scoring below the 25th percentile in reading in School #1; in School #2 there are 7 percent fewer children performing below the 25th percentile in mathematics. It should be noted that for this project there has been an increase of 3 percent in the children testing above the 75th percentile in reading and 7.5 percent above that level in mathematics. These data indicate that children at all levels of achievement are benefitting from the schooling being provided.

Limited English Speaking Students' Engaged Rate and Achievement

This study includes 35 students in School #1 who were limited in their

Table 6

Percent of Students in Each Achievement Quartile

Spring 1982, 1983 and 1984

	1st Quartile 0 to 25%			2nd Quartile 26% to 50%			3rd Quartile 51% to 75%			4th Quartile 76% to 100%		
	1982	1983	1984	1982	1983	1984	1982	1983	1984	1982	1983	1984
SCHOOL #1												
Reading	39%	34%	24%	25%	27%	34%	19%	18%	20%	17%	21%	22%
Math	30%	26%	24%	27%	28%	29%	24%	23%	23%	19%	23%	24%
SCHOOL #2												
Reading	21%	25%	20%	27%	21%	23%	27%	25%	31%	25%	25%	26%
Math	16%	11%	9%	22%	17%	20%	34%	36%	33%	28%	36%	38%

ability to speak English (LES) and who had pretest and posttest achievement tests and engaged rate scores. Because LES children do not function well in English, it might be hypothesized that they would be less likely to pay attention in class and be engaged in their work than the English speaking children. The 1983 and 1984 engaged rates were tested separately for differences between LES and English speaking children.

While the English speaking children were more engaged in reading than the LES children ($p<.06$) in spring 1983, by spring 1984 the LES students were significantly more engaged than were the English speaking children ($p<.05$) in reading. In mathematics, the LES students were more engaged than their English speaking counterparts, but the differences in the two groups were not significant.

The LES students were clearly improving their ability to stay on task for longer periods of time. The mean gains for LES students' engaged rates were significantly greater than the gains of the English speaking students ($p<.02$).

Each year of the study, the English speaking children scored significantly higher in reading and mathematics on their achievement tests (see Table 7) than did the LES students. The differences between LES and English speaking achievement scores were greater in reading than in mathematics. This is not surprising since mathematics tends to be a universal language; the numerals are the same in most cultures. Importantly, the LES childrens' achievement test scores improved each year. In fact, their gain in reading was significantly more than the English speaking children from years 1983-1984 ($p<.05$). LES gain in mathematics was greater in 1982-1983 ($p<.03$). Apparently the immersion in English program offered in School #1 is helpful to limited English speaking children.

Table 7

T-tests between Limited English Speaking and English Speaking Students
Reading and Math Achievement

Group	Degree of Freedom	Mean	Standard Deviation	Pooled Variance Estimate T-value	Pooled Variance Estimate One-tailed Probability
READING					
1982 English Speaking	186	50.02	84.10		
1982 Limited English Speaking	30	23.63	13.68	2.00	.02
1983 English Speaking	186	49.73	20.94		
1983 Limited English Speaking	35	26.25	16.67	6.08	.0001
1984 English Speaking	170	52.81	17.77		
1984 Limited English Speaking	30	35.25	15.25	7.33	.0001
MATH					
1982 English Speaking	186	52.83	21.05		
1982 Limited English Speaking	30	32.78	17.19	4.79	.0001
1983 English Speaking	186	53.04	19.98		
1983 Limited English Speaking	35	38.92	15.15	4.02	.0001
1984 English Speaking	159	53.39	17.94		
1984 Limited English Speaking	35	42.17	14.89	4.62	.0001

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Correlations

The instructional skills taught in the Madeline Hunter Model are considered by some educators as generic to teaching, i.e. good teachers naturally use these methods without training. If this assumption has merit, it would be interesting to identify relationships between students' scores and teachers' instructional skills (as measured by the ISOI) before the Hunter training started. Thirteen teachers for whom we have complete data sets (baseline/winter 1983, spring 1983 and spring 1984) were used in the correlations.

These computations using winter 1983 scores found no correlation in reading between ISOI, achievement, or engaged rate. However, in mathematics there was a significant correlation (.58) significant at $p<.02$ between the baseline ISOI and mathematics achievement scores. This finding indicates that even before the training some teachers were providing the types of activities measured on the ISOI to a greater degree than were other teachers, and students with teachers having higher ISOI scores had higher scores on the mathematics achievement test in spring 1983.

Of considerable interest then is the relationship between teacher ISOI scores and student mathematics achievement after the training was provided. Using the spring ISOI total score and the four components, correlations were computed with engaged rates, achievement test scores, and gain scores. The four ISOI components were included because each may relate differently to the outcome variables.

The analyses of mathematics are displayed on Table 8. Of 28 possible correlations computed in spring 1983, 19 were significant at $p<.01$, five at $p<.05$, and two at $p<.10$ level. Most important to the study are the relationships between the ISOI and the outcome measures, Achievement, Achievement Gain, and Engaged Rate. In spring 1983 all of these variables

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Table 8

Pearson-Product Moment Correlations of Mathematics Variables

SPRING 1983

	ACH	GAIN	ISOI	SET	INS	GP	IND
ENGAGED RATES	.43*	.18	.62***	.61***	.62***	.56**	.54**
ACHIEVEMENT	-	.53**	.63***	.64***	.49**	.81***	.78***
ACHIEVEMENT GAIN		-	.56**	.46*	.38	.71***	.65***
OVERALL ISOI			-	.91***	.95***	.92***	.85***
ANTICIPATORY SET				-	.87***	.73***	.73***
INSTRUCTION					-	.74***	.67***
GUIDED PRACTICE						-	.92***
INDEPENDENT PRACTICE							-

SPRING 1984

	ACH	GAIN	ISOI	SET	INS	GP	IND
ENGAGED RATES	.47**	.24	.42*	.44*	.06	.36	.40*
ACHIEVEMENT	-	.40	.55**	.17	.37	.48**	.47**
ACHIEVEMENT GAIN		-	.02	.09	.17	.20	.14
OVERALL ISOI			-	.45*	.78*	.88*	.30
ANTICIPATORY SET				-	.11	.27	.18
INSTRUCTION					-	.82***	.23
GUIDED PRACTICE						-	.06
INDEPENDENT PRACTICE							-

* = $p < .10$
** = $p < .05$
*** = $p < .01$

had a positive relationship ($p<.05$). In spring 1984 ISOI was related to engaged rate and achievement test scores but not to achievement gain.

One explanation for the consistent relationship at each data point between ISOI and mathematics achievement test scores could be that higher achieving students were placed in the classrooms of the best teachers, who happened to use ISOI skills to a greater degree than did other teachers. However, in these schools the children for each class are grouped heterogeneously. Even limited English speaking (LES) students are scattered randomly through the classrooms. Thus, it appears from these findings that students in classrooms of teachers who use the ISOI instructional skills to a greater degree are more engaged in their studies and have higher achievement test scores. The lack of relationship with gain in mathematics and ISOI in 1984 may be explained in part by one teacher whose children made substantial gain in mathematics, but who did not have high ISOI scores. In a sample as small as thirteen, one outlier can have considerable impact on the correlations.

While achievement test scores were related to engaged rate each year of the study, engaged rate was not related to gain in mathematics. These findings suggest that high achieving students are likely to be more engaged in their work or conversely, students who are engaged in their work have higher achievement test scores, but it does not indicate that being engaged in work will necessarily lead to gain in mathematics.

Gain in mathematics was related only to the teacher's ISOI score and particularly to the components of guided practice and independent practice. Given the structure of mathematics lessons, these components are likely to be used more frequently and consistently in mathematics lessons than are the set or the instructional component as defined in the ISOI. Set and instruction may occur only when introducing a new lesson, whereas guided

practice will occur every day along with checks for understanding. Independent practice indicates mastery of the lesson.

The findings in the reading analyses are very different from those of mathematics. The total ISOI was only related to engaged rate in spring 1983 and only to achievement in 1984 (see Table 9). ISOI was not related to reading gain in any of the analyses. Engaged rate was related to reading achievement ($p<.01$) and to achievement gain ($p<.10$) as well as to ISOI in 1983, but only to achievement and three components of ISOI in 1984. The lack of consistency in the findings for reading in 1983 and 1984 limits interpretation or conlusions to be drawn from the reading correlational analyses. Similar computations will be conducted at the end of Phase III of the study. Hopefully, these additional analyses will contribute to the understanding of these relationships.

Control Schools

There is convincing data that the students in the two experimental schools have been making steady improvement in achievement test scores. However, since they historically serve low achieving students, there may be a tendency for scores to regress toward the mean. One way to evaluate the progress of the experimental schools is to compare their achievement progress with the progress of schools serving similar populations during the same time period.

Locating control schools was difficult since the school districts are small and the two project schools were selected because they had lower test scores and served lower socioeconomic groups of children than other schools in their districts. The two control schools selected are the best available to serve as comparisons. Characteristics of the control and experimental schools are shown on Table 10. School #1 is very close to its control school on all characteristics except Aid to Dependent Children

Table 9

Pearson-Product Moment Correlations of Reading Variables

SPRING 1983

	ACH	GAIN	ISOI	SET	INS	GP	IND
ENGAGED RATES	.71***	.44*	.51**	.22	.53**	.43*	.47**
ACHIEVEMENT	-	.40*	.20	-.07	.18	.28	.18
ACHIEVEMENT GAIN		-	.02	.06	.12	.06	.30
OVERALL ISOI			-	.59***	.96***	.90***	.69***
ANTICIPATORY SET				-	.56**	.33	.51**
INSTRUCTION					-	.86***	.61***
GUIDED PRACTICE						-	.41*
INDEPENDENT PRACTICE							-

SPRING 1984

	ACH	GAIN	ISOI	SET	INS	GP	IND
ENGAGED RATES	.45*	.08	.25	.47*	.45*	.53**	.04
ACHIEVEMENT	-	.58**	.74***	.69***	.59**	.59**	.28
ACHIEVEMENT GAIN		-	.33	.02	.22	.38	.25
OVERALL ISOI			-	.74***	.93***	.91***	.20
ANTICIPATORY SET				-	.58**	.44*	.38*
INSTRUCTION					-	.88***	.09
GUIDED PRACTICE						-	.06
INDEPENDENT PRACTICE							-

* = $p < .10$
** = $p < .05$
*** = $p < .01$

Table 10

Characteristics of Experimental and Control Schools

	EXPERIMENTAL #1	CONTROL #1	EXPERIMENTAL #2	CONTROL #2
Enrollment	456	428	220	536
Limited English Speaking	15%	12%	18%	6%
Aid to Dependent Children	32.4%	14.4%	19%	22%
Transiency (% of students enrolled for 3 years)	38%	43%	57%	60%
Socioeconomic Data: % Parents				
Professional	5%	6%	17%	20%
Semi-Professional	9%	13%	13%	10%
Skilled	50%	44%	47%	57%
Unskilled	34%	35%	23%	6%
Unknown	2%	2%	0%	7%

where the experimental school serves over twice as many needy children. Another large difference is in the size of Control School #2 which is twice as large as Experimental School #2. Also, Experimental School #2 has three times as many LES students as does Control School #2. Given that Experimental School #2 does not include LES students in the school achievement testing, the total school scores would not be deflated by the LES students. Economically, the school populations are similar. For example, 19 percent of School #2 and 22 percent of its control school families receive Aid to Dependent Children.

Achievement scores for the schools are compared on Table 11. Individual student scores were not available in the control schools. Thus, the comparisons are made using the scores for the students in first, second, and third grades in 1982, 1983, and 1984. The average experimental school gain in reading was 5.8 NCE points between 1982 and 1984 while the control schools' average gain was 2.1 NCE points. In mathematics the experimental schools' average gain was 2.3 NCE points and the control schools' gain was 1.0 NCE points. Control School #1 had lower scores in both reading and mathematics in 1984 than in 1982. During that same time period Experimental School #1 had small but consistent gains in both reading and mathematics.

Experimental School #2 had a lower mean reading achievement NCE score than its control in 1982, and by 1984 School #2 had a slightly higher mean score than its control. However, Control School #2 made slightly more progress than did the experimental school in mathematics from 1982 to 1984.

Summary and Conclusions

The findings from the Phase II and III analyses of mathematics are consistent. Even before the training, teachers' ISOI scores related significantly to mathematics achievement test scores (r=.52); in spring

Table 11

Experimental and Control Schools: Reading and Math Achievement

1982 - 1983 - 1984

	1982	1983	1984
READING			
Experimental 1	42.5	45.6	47.0
Control 1	50.5	55.4	49.9
Experimental 2	49.7	53.4	56.8
Control 2	51.9	54.4	56.7
MATH			
Experimental 1	47.6	49.0	49.8
Control 1	50.6	47.6	48.3
Experimental 2	56.6	58.8	59.1
Control 2	55.3	57.2	59.6

*These scores were first transformed and then aggregated. Each school mean is reported in its normal curve equivalent.

1983 the relationship was r=.63 and in spring 1984 r=.55. These findings suggest that teachers who naturally or by training provided a higher quality of instructional skills as defined in the Hunter model had students with higher test scores. This could be interpreted conversely that the better students were placed with the better teachers. However, one school in the sample had only one class for each grade level. In the other school the students were heterogeneously grouped in two classes at each grade level. Thus, the relationship of ISOI and achievement cannot be explained by placement of higher achieving children with the better teachers. The teachers' ISOI scores did improve and the variance in scores narrowed. The students did improve their achievement scores.

Importantly, children who had greater achievement gain in mathematics from 1982-1983 were in classrooms of teachers with higher ISOI scores. This same finding for mathematics was not true for Phase III of the study. One speculation regarding this inconsistency relates to the high student attrition rate which is nearly 30 percent per year. Since only those students with complete test data sets from 1982 were used in the computations, the dwindling sample of students may be different in Phase III from Phase II. These differences could seriously impact the correlational relationships. For example, the baseline analyses in 1982 had 259 complete sets of student scores. In 1984, only 153 of the students measured in 1982 had complete sets of scores. Perhaps the children who made the most gain left the study at higher rates, or those who stayed may be the high achievers. A comparison of baseline scores of those children leaving the study with those remaining in the study would answer questions regarding the nature of the sample remaining.

The analyses of the relationships between engaged rate, achievement, and gain are also of considerable interest. In Phases II and III both

reading and mathematics engaged rate related solidly to achievement, but minimally with gain or instructional skills measured on the ISOI. Engaged rate did increase both years as did teachers' ISOI scores. However, the lack of correlation suggests that the increase in engaged rate may be due to some factor other than ISOI skills. The increase in student engaged rate may be due to the feedback that teachers received on individual children after each time off task observation. During these feedback sessions, teachers examined the behavior of particular children and speculated on grouping plans and lesson plans that might be more appropriate for the children having problems. Another explanation of increased engaged rate might be the classroom management component provided which helped teachers plan and manage classroom behavior. The management training was in addition to the usual Madeline Hunter program.

Another important finding is that children who have limited English speaking (LES) skills benefitted from this program. Although still operating lower than their English speaking counterparts, the LES students' gain each year in reading and mathematics was more than the gain made by the other children in the study. The LES engaged rates also increased significantly. The LES children included in these analyses were all in School #1 which used an immersion program rather than a pullout program.

The good news is that even though ISOI and engaged rate were not correlated with gain, the students in the project made significant gains in reading during Phases II and III of the study and in mathematics in Phase II. Over the two years of the project, the average gain in NCE points was 5.8 in reading and 2.3 in mathematics. Analyses of who thrived indicated that 8 percent of those students performing below the 25th percentile in reading and 7 percent in mathematics moved above that level from 1982 to 1984. Three percent more children improved scores above the 75th

percentile in reading and 7.5 percent more were above that level in mathematics. These achievement gains may be attributed to factors other than the skills measured by the ISOI such as the continuing staff development program, feedback from the project staff, or support from the principals. The curriculum alignment activities are also likely to explain some of the improvement in instruction.

Given that these schools gave up their classroom aides and did receive in-depth and continuous staff development opportunities, how does their progress compare with similar schools? The answer to this question is not complete. The schools with similar populations in the district were still poor comparisons. School #1 started the study 8 NCE points in reading behind the control school. From 1982 to 1984 School #1 improved 4.5 NCE points while the control school dropped .6 NCE points. School #2 was less than half the size of its control school. School #2 started the study 2.2 NCE points behind the control school in reading and in 1984 was .1 ahead of the control.

In mathematics School #1 started 3 NCE points behind its control school and ended in 1984 with a 1.5 advantage. The control School #2 achieved a greater gain (NCE 1.8) than the experimental school.

These analyses are confounded in part by using all of the students available in the control schools first through fourth grades during 1982, 1983, and 1984. The students used in the experimental schools were limited to those with complete data sets. Those who moved out of the school or who had entered the school since 1984 were not included in the analyses. Another analysis is needed using only students who have scores for each of those test periods from experimental and control schools. This would allow comparison of program effects over the years of the project. As previously noted, the attrition rate is approximately 30 percent per year. It is

difficult to educationally impact students who rotate in and out of school. Nevertheless, the schools in the Follow Through project are making more progress than they did prior to the project.

The question for debate is "Are the student achievement gains worth the cost?" In order to comply with the mandate in the RFP that no Chapter I funds may be used during the operational phase of the project (years 2, 3, and 4), both experimental schools gave up considerable amounts of money in order to participate in the Follow Through research study. For example, School #1 during 1983-1984 gave up $50,375 in Chapter I funds. During 1984-1985 this same school gave up $43,550 of Chapter I funds. School #2 gave up $20,000 of funds yearly in order to participate. In most cases, these cuts were reflected in an elimination of Chapter I funded instructional aides.

The project that the two schools are participating in was funded as a formal contract between the Napa County Office of Education, (Napa, California) and the National Institute of Education. The yearly expenditures for the project services have been approximately $70,000. This amount has provided a .60 FTE project director, a .60 FTE secretary, consultant services for training, follow-up and principal consultations, release time for teachers, materials and supplies for housing, and utilities costs.

While it might be desirable to compare the project costs with traditional Chapter I expenditures, it is difficult. Many of the project expenditures would not be necessary if new school districts chose to implement this comprehensive staff development program. It is likely that this program could be provided at a cost lower than or equal to a traditional Chapter I program.

The value of the Follow Through research project in conceptual terms

seems much higher than the traditional Chapter I program where program dollars are spent for classroom aides. While aides may directly benefit students, with increased salaries or budget cuts students receive fewer hours of service. When aides are gone, there are seldom lingering benefits. In contrast, the dollars spent in the Follow Through program have been invested in the natural resources of the school: its teachers. A school level capacity for carrying on the training is being created via the principals and teachers.

Although this project has as its major focus an examination of the effects of staff development on teaching behaviors, student engaged rates, and student achievement, it has provided several additional lessons. Experiences in implementing project trainings have yielded important information about how to provide effective follow-up and support services. Working in project schools has reemphasized what the literature on change has already documented: change is a slow, incremental process.

The project experience has shed light on the leadership function at the school. The importance of communication cannot be understated. Project staff and school administrators need strong human relations skills to integrate a multi-dimensional project into a school. Principals need to have an ability to conceptualize and need to have a broad vision of staff development and school improvement. Extensive administrative training is necessary to develop these skills. In this project, expanding the leadership function at the school through the Principal's Advisory Committee and through shared facilitation of faculty meetings has greatly enhanced staff problem-solving skills and school climate.

Providing teachers with formative evaluation data has promoted positive classroom changes and, in the process, has built commitment to the project and engendered teacher interest in research. Overall, the

teachers' implementation has improved on the Hunter instructional skills components. Students are more engaged in their work, and their progress in achievement gains has been not dramatic but steady. The final year of the study, Phase IV, will allow a more definitive longitudinal analyses of the project effects on teachers and students.

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